Job Creation Abroad and Worker Retention at Home*

Sascha O. Becker‡
U Munich, CESifo and IZA

Marc-Andreas Muendler
UC San Diego and CESifo

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Abstract

Using linked data on German manufacturing employees and their employers' multinational activities, we document that multinational enterprises (MNEs) exhibit four percent smaller rates of job loss than non-MNEs. The higher retention rates at MNEs cannot be explained by a comprehensive set of present or past employee, employer and sector characteristics alone. A significant part of the higher worker retention rates at MNEs is either due to the MNE's foreign expansion itself or to the employer's inherent competitive success across locations. Significantly higher worker retention rates at MNEs are consistent with the notion that hindering MNEs in their foreign expansions would result in even more domestic job losses to globalization.

Keywords: Multinational enterprises; international investment; demand for labor; worker separations; linked employer-employee data

JEL Classification: F21, F23, J23, J63

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‡sbecker@lmu.de (*www.sobecker.de*), corresponding author

1 Introduction

The employment consequences of multinational enterprises' global expansions receive substantial public interest. Surprisingly, however, data at the job or worker level are rarely available to investigate this issue more closely. This chapter presents such novel data for Germany and provides evidence on worker separations across industries and firm types—with a particular focus on the distinction between firms that are expanding abroad through ownership of foreign affiliates and those that are not. Contrary to a wide-held perception, both among researchers and in the general public, multinational enterprises offer more stable jobs at home and exhibit lower worker separation rates than their competitors without foreign expansions do. We explore this difference in separation rates by relating it to foreign direct investment (FDI) expansions in Central and Eastern Europe, and worldwide, and by controlling for a rich set of worker, job, home-firm, foreign-affiliate and sector characteristics.

Theory predicts that trade affects labor demand and thus employment stability. Empirical evidence suggests that multinational enterprises (MNEs) channel a large fraction of cross-border trade through their global in-house activities. MNEs with headquarters in the U.S., for instance, transact more than two in five exports and around half of U.S. imports through their affiliates (Zeile 1997). UNCTAD reports that the world's ten largest MNEs in 2000 produce almost one percent of world GDP, and that the one hundred largest MNEs are responsible for more than four percent of world GDP (up from three-and-a-half percent in 1990).[1]

This chapter documents that manufacturing MNEs exhibit four percent lower domestic worker separation rates than non-MNEs in manufacturing. Neither worker characteristics, nor the MNE's workforce composition and other observable MNE characteristics, nor sector variables alone can explain the fact that worker retention rates are higher at MNEs: conditional on sector, employer and worker characteristics, an indicator of an FDI expansion in Central and Eastern Europe (CEE) still predicts 1.6 percentage points lower worker separation rates at MNEs with expansions into CEE, and 1.8 percentage points lower separation rates for expansions anywhere worldwide. To rule out a temporary coincidence of foreign expansions and increased home worker retention rates, or transitory firm-level shocks that might drive both foreign employment expansions and home worker retentions, we instrument for current foreign expansions with an MNE's past employment, capital-stock and turnover expansions. The instrumental-variables estimate for past employment changes raises the predicted reduction in home separation rates to 2.6 percentage points for CEE. This increase in the point estimate is consistent with the ideas that either the foreign expansion itself raises the home-worker retention rate or that an MNE's permanent gain in competitive advantage raises both foreign expansions and home-worker retentions. Irrespective of the ultimate causal mechanism, which we leave for future research to settle, there is no evidence to blame MNEs for worker separations in the wake of global competition. To the contrary, our estimates are consistent with the prediction that preventing

[1] UNCTAD press release TAD/INF/PR/47 (12/08/02).

firms from a foreign workforce buildup could be associated with accelerated worker separations from domestic establishments.

Several interpretations are consistent with the finding that workers at MNEs retain their jobs more frequently than workers at non-MNEs. First, vertical foreign expansions that fragment the production process can lead to cost savings, increased world-wide market shares, and domestic employment growth. Second, horizontal expansions that duplicate production at foreign locations can lead to improved market access with potentially beneficial consequences for headquarters employment. Third, complementarities between foreign and home operations can favor higher worker retention rates at MNEs (Harrison, McMillan and Null 2007). The former three mechanisms emphasize multinational production and sales activities and their potential beneficial impact on home employment. Fourth, the stability afforded by in-house relationships across borders, compared to arm's length trade, can result in more stable business prospects so that the choice of contracting mode can reduce worker turnover. Fifth, foreign expansions can signal attractive career paths to domestic workers and reduce worker quits (Prendergast 1999) because an MNE's foreign investment commits a firm to expansion and thus becomes a device for worker retentions. All five prior mechanisms posit a causal link from foreign expansions to home employment stability. Sixth, a firm's inherent competitive advantage in product quality or production efficiency can cause foreign expansions and foster home-job retentions. Under this last mechanism, the foreign expansion is not causal to home worker retentions but a consequence of the firm's competitive success, as are home worker retentions. Irrespective of the causal interpretation under any of the six mentioned mechanisms, there is no evidence to suggest that MNEs should be prevented from overseas expansions to save jobs at home. To the contrary, the findings are consistent with the notion that hindering MNEs in their foreign expansions could result in even more domestic job losses to globalization and even stronger downward wage pressure on import-competing jobs.

There are largely three branches of the empirical literature that investigate impacts of global economic integration on domestic labor-market outcomes. A first group of studies analyzes the labor-demand effects of foreign trade, irrespective of the type of employing firm. Feenstra and Hanson (1999), for instance, analyze sector data for the U.S. and attribute about a third of U.S. relative wage changes to foreign trade and cross-border outsourcing (between or within firms). In related recent work, Geishecker (2006) uses individual household survey data for Germany to study the effect of industry-wide intermediate-goods imports on German workers and finds cross-border outsourcing to significantly reduce individual employment security.[2]

A second line of research investigates how foreign presence affects labor demands within MNEs. In this literature, Slaughter (2000) does not find foreign wages in MNEs' foreign locations to significantly affect labor demand at U.S. MNEs' home operations, and Konings (2004) reports a similarly insignificant relationship between foreign wages and home labor demands for European MNEs. Considering the preponderant role of

[2]A literature on worker separation is concerned with consequences of worker layoffs (e.g. Jacobson, LaLonde and Sullivan 1993, Kletzer 2001).

MNEs in the conduct of foreign trade, these findings stand in surprising contrast to Feenstra and Hanson (1999) or Geishecker (2006). Taken together, they seem to suggest that the labor-market consequences of foreign trade are largely due to between-firm trade rather than within-MNE trade. Other studies find modest substitution between workers in domestic establishments and foreign affiliates (Konings and Murphy 2006, Marin 2006). Hanson, Mataloni and Slaughter (2005), however, shift focus from factor demands to intermediate input uses and, as an exception to most prior firm-level evidence, report that affiliates of U.S. MNEs process significantly more intra-firm imports the lower are low-skilled wages abroad. The result challenges the view that foreign locations with a relative abundance in labor fail to attract MNE activity. Harrison et al. (2007) recently report that there is a positive correlation between home employment and foreign-affiliate employment in high-income countries but a negative correlation between home employment and foreign-affiliate employment in developing countries. Integrating foreign location choice (Devereux and Griffith 1998, Head and Mayer 2004) into labor demand estimation in Muendler and Becker (2006), we discern MNEs' labor demand responses to foreign wages at the extensive margin, when an MNE establishes its presence at foreign locations, and at the intensive margin, when an MNE operates existing affiliates across locations. This approach shows salient employment adjustments to international wage differences: With a one-percent increase in German wages, for instance, German MNEs add 2,000 manufacturing jobs in CEE at the extensive margin and 4,000 jobs overall.

A third group of studies, to which the present chapter belongs too, contrasts MNEs with non-MNEs. Egger and Pfaffermayr (2003) compare domestic capital investments of pure exporters to those of MNEs and do not find a significant difference. Barba Navaretti and Castellani (2004) and Jäckle (2006) assess the effect of first-time FDI on firm performance regarding size and productivity and do not find significant effects of outward FDI on MNE home performance for their respective samples of Italian and German MNEs.

To our knowledge, there is to date no job-level research into the effects of MNE activities using linked employer-employee data. Linked employer-employee data allow us to investigate whether MNEs that expand abroad retain workers more or less frequently than competitors, while controlling for a comprehensive set of worker, job and employer characteristics. We document a statistically and economically significant positive association between FDI expansions and domestic worker retention rates, for MNEs with no prior foreign presence and for expanding MNEs in CEE and worldwide. Together, the results from prior research on import competition (Feenstra and Hanson 1999, Geishecker 2006), labor substitution within MNEs (Harrison et al. 2007, Muendler and Becker 2006), and the evidence in the present chapter suggest that both intra-firm and cross-firm trade are associated with employment substitution but that MNEs with foreign employment expansions can offer more stable employment in the wake of global competition than non-MNEs. Put differently: global competition likely elevates home-worker separation rates, depending on an employer's industry to as much as 21 percent, but within industries MNEs manage to reduce these separation rates by

four percentage points on average, compared to non-MNEs.

The chapter has five more sections. Section 2 describes the construction of our linked employer-employee data (details are relegated to the Appendix.). Section 3 presents descriptive evidence on foreign job growth and domestic worker separation along with a nonparametric univariate regression. We present parametric multivariate regression results and robustness checks in Section 4. Section 5 concludes.

2 Data

We construct the linked employer-employee data set from three confidential micro-data sources, assembled at Deutsche Bundesbank in Frankfurt, and complement them with sector-level information on German foreign trade. We define enterprises as groups of affiliated domestic and foreign firms and consider all firms within a group as potential FDI firms if at least one firm in the group reports outward FDI activity. We weight the FDI exposure measures by the domestic ownership shares that connect the firms in the group. Firms outside any group with FDI exposure are classified as purely domestic firms.

The first component of our linked employer-employee data set, worker and job information, comes from quarterly social-security records of the German Federal Labor Agency (Bundesagentur für Arbeit BA).[3] The observations are the universe of workers registered by the social insurance system over the years 1999-2001, representing around 80% of the formally employed German workforce.[4] The records show separations (but do not permit a distinction between voluntary quits by the worker and layoffs by the employer). The records contain worker and job characteristics such as age, education level, occupation and wages. Wages in the German social security data are censored above but not below. The upper bound is the contribution ceiling for old-age insurance, which is annually adjusted for nominal wage changes. In 2000, the upper bound was at an annual wage income of EUR 52,765, and it was EUR 53,379 in 2001—except for miners (*Knappschaftliche Rentenversicherung*) with a ceiling of EUR 65,036 in 2000 and EUR 65,650 in 2001. Workers with an annual income below 3,865 EUR (in 2001) are not subject to social security contributions, but are part of our data and estimation sample and we control for their inclusion (minor employment). We construct establishment-level information by aggregation from the individual-level information.

Second, information on outward FDI comes from the MIDI database (MIcro database Direct Investment, formerly DIREK), collected by Deutsche Bundesbank (BuBa); see

[3]These individual worker data were made available under article 75, Volume 10, of the German Social Security Code.

[4]Coverage includes full- and part-time workers of private enterprises, apprentices, and other trainees, as well as temporarily suspended employment relationships. Civil servants, student workers, and self-employed individuals are excluded and make up the remaining 20% of the formal-sector labor force. Establishments within the same municipality may report under one single establishment identifier. Though our data directly derive from the BA source, the description by Bender, Haas and Klose (2000) for the scientific-use version of the BA data also applies to our records.

Lipponer (2003) for a documentation. The MIDI data on outward FDI cover the foreign affiliates of German MNEs above ownership shares of 10 percent.[5] For the purposes of the present analysis, we extract information on affiliate employment, affiliate turnover and affiliate capital stocks as well as the FDI-reporting parent firm's ownership share in the foreign affiliate.

Third, in order to link the two data sources on domestic and foreign activities, we use the commercial corporate structure database MARKUS (from Verband der Vereine Creditreform) which allows us to identify all domestic parents and affiliates of FDI-reporting firms. Multinational enterprises are also multi-firm enterprises in the home economy so that outward FDI potentially affects workers beyond the FDI-reporting firm's workforce. Moreover, many German enterprises bundle the domestic management of their foreign affiliates into legally separate firms (mostly limited liability *GmbHs*) for tax and liability reasons. Those bundling firms then report FDI to MIDI as required by German law. The economic impact of the reporting firm's FDI, however, goes beyond the firm's formal legal boundary in that jobs throughout the corporate group can be affected. We consider all firms within a corporate group (an enterprise) as *potential* FDI firms if at least one firm in the group reports outward FDI activities.

The three data sources do not share common firm identifiers. We use a string-matching procedure to identify clearly identical firms and their establishments (see Appendix A for a detailed description). We take the year $t = 2000$ as our base period because it is the earliest year for which we have firm structure information and can adequately attribute outward FDI exposure to domestic jobs. Our linked sample data provide a cross-section of establishments around year $t = 2000$, including a total of 39,681 establishments whose German parent-firms conduct FDI abroad and 1,133,920 control establishments—out of 3.8 million establishments in the full worker sample (1998-2002). We use a 5% random sample of workers (93,147 job observations) to reduce estimation runtime to acceptable length. A random subsample of workers also reduces potential problems of error correlations between workers in the same establishment.

We observe worker characteristics, jobs and domestic establishments at $t{-}1 = 1999$, prior to the foreign expansion (from BA files in June 1999; June files being the most reliable during the year). The foreign expansion period (for changes to a job's FDI exposure) runs from $t-1 = 1999$ (foreign-affiliate balance-sheet closing dates in 1999) to t (closing dates in 2000). Most characteristics vary little between $t-1$ (before the foreign expansion) and t (after the foreign expansion), so we simplify the timing in some specifications by considering t to still be pre-expansion. A worker's retention or separation is observed between t and $t{+}1 = 2001$.

We complement these micro-data with annual information on imports by source country and exports by destination country from the German Federal Statistical Office, and on aggregate intermediate-goods imports, final-goods imports, and exports to

[5] In 1999 and 2000, reporting is mandatory for all foreign affiliates with an asset total of at least EUR 10 million and at least a ten-percent ownership share of the German parent, or an asset total of at least EUR 1 million and at least a 50-percent ownership.

world regions by German sector at the *NACE* 2-digit level.[6]

Domestic worker separations. Our dependent variable is an indicator of a domestic worker's separation from job i. We denote the occurrence of worker separation with y_i. The indicator takes a value of one if the holder of the job is displaced from the employing establishment between years t and $t+1$ (note the one-year lead between foreign expansion and worker separation), and is zero otherwise. Worker separation includes both quits and layoffs. The German social-security records do not distinguish quits from layoffs. A change of occupation within the employing establishment is not considered a separation.

Foreign employment expansions. We compute measures of changing FDI exposure both for FDI in Central and Eastern Europe (CEE), the region where German FDI expanded most markedly since the fall of the Iron Curtain, as well as world-wide (WW) FDI. Consistent with our employment perspective on domestic firm operations, we also consider foreign activities in terms of employment and construct two measures of the parent firm's change in FDI.[7] First, we use a binary foreign-expansion dummy that indicates an employment expansion at foreign affiliates in CEE, or anywhere worldwide. The indicator takes a value of one for a domestic job i if the employing enterprise expands its FDI exposure between years $t-1$ and t, and zero otherwise. This measure is unweighted in the sense that we set the predictor to one irrespective of the enterprise's ownership share in the domestic FDI-reporting firm and irrespective of that FDI-reporting firm's ownership share in the foreign affiliates. Second, we use a continuous predictor: employment changes at foreign affiliates. This continuous variable is defined as the MNE's change in foreign-affiliate employment, weighted by both the ownership share of the enterprise in the domestic FDI-reporting firm and that FDI-reporting firm's ownership share in the foreign affiliates.

Using domestic ownership shares as weights, we attribute FDI (foreign employment) to related domestic firms and their jobs within the corporate group (see Appendix B for details of the procedure). We compute *cumulated* and *consolidated* ownership shares for all German firms that are in the same corporate group with at least one FDI-reporting firm. Cumulating means adding all direct and indirect ownership shares of a parent firm in a given affiliate. Consolidation removes the degree of self-ownership (α) from affiliates, or intermediate firms between parents and affiliates, and rescales the ultimate ownership share of the parent to account for the increased control in partly self-owning affiliates or intermediate firms (with a factor of $1/(1-\alpha)$).

[6] We calculate intermediate-goods imports by foreign location using the import share in sector inputs as reported by the German Federal Statistical Office under the assumption that source-country frequencies are similar for intermediate-goods imports and final-goods imports.

[7] Domestic worker separations measure changes in gross labor demand at home. So, a natural counterpart to the dependent variable is a predictor that measures the change in a domestic job i's FDI exposure.

In 2000, 68 percent of German MNEs' foreign affiliates are fully owned (with 100 percent ownership share), and 86 percent of these foreign affiliates are strictly majority-owned (with strictly larger than 50 percent ownership share). So, foreign-ownership weighting has little impact on our continuous measure of foreign employment. We choose foreign ownership weighting for consistency because our domestic-job exposure measure to FDI expansions is weighted by the ownership share of the job's corporate group in the FDI-reporting German firm, and we extend this principle to foreign affiliates.

Additional covariates. In multivariate regressions, we use a comprehensive set of covariates that can predict worker separation. Among the worker characteristics are the worker's age in years, indicators of the worker's gender and education, and the worker's (log) monthly wage in the current job. We transform education information into an indicator for more than upper-secondary schooling.[8] Among the job characteristics are the worker's occupation in a blue- or white-collar job, and indicators whether the worker's current work status is that of an apprentice, whether the employment is part time, whether the worker's earnings qualify the job as a minor employment exempt from social security contributions, or whether the job is temporary.[9] Among the domestic establishment characteristics that we observe or infer are workforce size, workforce composition by worker and job characteristics, and an East-West Germany location indicator. As discussed in detail above, we observe parent-firm foreign activity as affiliate employment in CEE and worldwide. We use current employment expansions as predictors in multivariate regression, and past employment, turnover and capital-stock expansions as instrumental variables to remove potentially confounding transitory firm-level shocks from the multivariate regression. Sector-level measures of German foreign trade complete the specifications.

To obtain a control variable for establishment-level differences in productivity, we estimate the establishment-fixed component in German wages from a Mincer (1974) regression for June 2000 workers with a full set of observable characteristics and include the establishment-specific measure among the pre-expansion covariates. To the extent that FDI exposure is the result of enterprise characteristics such as productivity or capital intensity, we use the enterprise's past FDI exposure to control for those characteristics' FDI-relevant aspects.

[8]This includes college graduates and college-qualified professionals, i.e. professionals with a university-qualifying secondary schooling degree (Abitur), who completed professional training or an apprenticeship program instead of college education. By law, professional training and apprenticeship programs for upper-secondary schooling graduates can be no shorter than two years.

[9]In contrast to part-time work, temporary work status includes working family members in agriculture, employees past retirement age with temporary contracts, working retirees, and sporadically employed workers. Sailors, who formally belong to this group by German work status classifications, are excluded from our sample.

Table 1: Affiliate Employment by World Region

World Region	1991	1994	1997	2000	2001
	(1)	(2)	(3)	(4)	(5)
CEE	45.6	172.9	374.2	634.5	666.3
DEV	452.0	481.0	556.1	718.1	723.8
OIN	464.9	487.3	568.5	804.5	827.8
WEU	919.1	1,001.8	1,202.7	1,508.0	1,539.4
WW (worldwide)	1,881.7	2,143.0	2,701.5	3,665.2	3,757.3

Source: MIDI 1991-2001. Employment in thousands. World regions (see Table 11): CEE (Central and Eastern European countries), DEV (developing countries), OIN (Overseas Industrialized countries), WEU (Western European countries), WW (World-Wide abroad).

3 Descriptive and Nonparametric Statistics

World-wide employment at German-owned foreign affiliates doubles between 1991 and 2001, increasing from 1.9 million employees in 1991 to 3.8 million in 2001. Table 1 presents the evolution of foreign affiliate employment at German MNEs by world region. While Western Europe continues to be the region with most foreign employment in absolute terms, Central and Eastern Europe (CEE) strikes out as the region that exhibits the most rapid rise in affiliate employment. In 1991 employment at German affiliates in CEE was a mere 46 thousand, but it increased by a factor of 14 to nearly 670 thousand employees in 2001, almost reaching an employment level comparable to total employment in all remaining developing countries (DEV). One might expect this substantial increase in foreign employment within close reach to German headquarters to be associated with employment changes in Germany. We therefore focus our analysis on CEE countries and contrast the predicted employment changes from CEE expansions with predictions from worldwide (WW) foreign activities.

There is considerable diversity in the foreign employment evolution across sectors of foreign affiliates and German parents. Table 2 shows that manufacturing sectors are by far the most important industries in terms of foreign-affiliate employment (columns 1 and 2). The three broad manufacturing industries—food and textiles, machinery and equipment, and other manufacturing—, constitute around 55 percent of worldwide (WW) affiliate employment and 61 percent in CEE in 2000. The sectoral distribution looks different, however, when considering the German parent sector to classify foreign employment (columns 3 and 4). Now, the financial and business services sector apparently dominates. As noted above, however, many German enterprises bundle the domestic management of their foreign affiliates into legally separate firms (mostly limited liability *GmbHs*) for tax and liability reasons. In MIDI at Deutsche Bundesbank, these holding companies are classified into the financial and business services sector. The economic impact of the reporting firm's FDI, however, goes beyond the firm's formal legal boundary in that jobs throughout the corporate group can be affected. We consider all firms within a corporate group (an enterprise) as potential FDI firms if at

Table 2: Affiliate Employment by Affiliate and Parent Sector in 2000

	Affiliate sector		Parent sector	
	CEE	WW	CEE	WW
	(1)	(2)	(3)	(4)
Agriculture & Mining	3.3	24.8	1.7	12.3
Food & Textiles	62.3	161.1	30.3	91.4
Machinery & Equipment	189.7	1,233.0	150.0	981.2
Other Manufacturing	135.2	800.8	81.0	489.6
Commerce	119.6	778.0	48.6	224.9
Financial & Business Services	50.8	338.2	269.3	1,658.5
Other Services	73.7	329.3	40.4	154.4
Household & Government			13.2	53.0
Total	634.5	3,665.2	634.5	3,665.2

Source: MIDI 2000. Employment in thousands. Locations: CEE (Central and Eastern European countries) and WW (World-Wide abroad).

least one firm in the group reports outward FDI activities, regardless of its own sector affiliation. Instead, we use the BA sector codes for individual domestic establishments in our later job-level analysis to make sure establishments and workers are classified according to their own activity and not according to a potentially misleading sector code from the FDI-reporting firm in MIDI. For classification of foreign activities, we use definitions from columns 1 and 2 in Table 2.

Because the majority of workers at affiliates abroad is employed in the manufacturing sector (three in five workers by Table 2), and because those sectors are less prone to misclassifications, we restrict our subsequent analysis to German manufacturing parents and their foreign manufacturing affiliates—as most of the prior literature does. We investigate the widely held assertion that MNEs shed more labor than non-MNEs as a consequence of the globalization process, and look at worker separation rates at the German manufacturing parent establishments in comparison to separation rates at German non-MNEs.

A concern for our measures of foreign employment expansions is that foreign employment changes might be associated with forms of foreign restructuring beyond employment buildups. To investigate the patterns of foreign expansions more closely for our manufacturing sample, we consider the four-year horizon between 1996 and 2000 and track changes to affiliate counts and country counts for MNEs with an initial presence in a foreign location in 1996. We focus on majority-owned foreign affiliates because foreign employment weighting by ownership share in our estimation sample emphasizes this group of affiliates. Table 3 shows that a large majority of MNEs with an initial foreign presence retains the same number of affiliates and stays present in the same number of countries. In CEE (WW), 186 (859) out of 242 (1,259) manufacturing MNEs with an initial manufacturing presence abroad exhibit the same number of affiliates over the four-year period, and 202 (946) show the same number of countries within

Table 3: Affiliate and Country Changes at MNEs

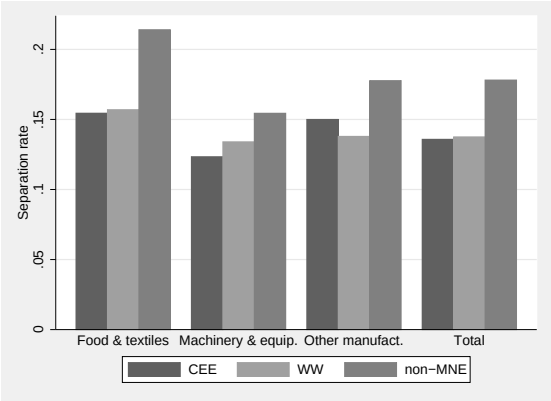
	Affiliate Changes		Country Changes	
	CEE	Worldwide	CEE	Worldwide
$\#_{2000} - \#_{1996}$	(1)	(2)	(3)	(4)
≤ -3	2	22	1	8
-2	3	31	1	15
-1	6	98	4	91
0	186	859	202	947
$+1$	25	149	25	134
$+2$	11	42	6	40
$+3$	2	22	0	10
$\geq +4$	7	36	3	14
Total	242	1,259	242	1,259

Source: MIDI 1996 and 2000, manufacturing MNEs and their majority-owned foreign manufacturing affiliates. MNEs with presence of at least one affiliate in 1996 in CEE (columns 1 and 3) or anywhere worldwide (columns 2 and 4). World regions for the worldwide statistics (columns 2 and 4) are (see Table 11): CEE (Central and Eastern European countries), DEV (developing countries), OIN (Overseas Industrialized countries), WEU (Western European countries).
Mean (median) number of affiliates by MNE in CEE in 2000: 1.49 (1), mean (median) number of countries by MNE in CEE in 2000: 1.25 (1).

foreign region. Naturally, in the shorter two-year time span of our linked employer-employee data, changes to the affiliate or country counts are even less frequent. Lacking changes in the counts could possibly conceal simultaneous divestments and acquisitions of affiliates, or simultaneous exits from one country within CEE and entry into another country. However, the data show that at most 8.5 percent of the MIDI manufacturing MNEs with no change in affiliate number counts simultaneously divest and acquire another affiliate,[10] and that only 4.5 percent of them switch countries within foreign region. The median number of foreign affiliates (and thus foreign countries) by region is one, with a mean of 1.49 (1.25). These patterns indicate that changes to foreign employment within a foreign region are largely driven by adjustments at two margins: entry into the foreign region with a first affiliate, and expansions of the workforce at existing affiliates.

Domestic worker separations. On average across manufacturing industries, worker separation rates are 14% both at manufacturing MNEs with a presence in CEE and WW, and 18% at non-MNEs. So, worker separation rates are higher by about 4 percentage points across all manufacturing sectors. Regarding domestic worker separation

[10]Name changes, changes in legal form, or other re-classifications of foreign affiliates could also result in an apparently different foreign affiliate ID so that the actual percentage may be even smaller.



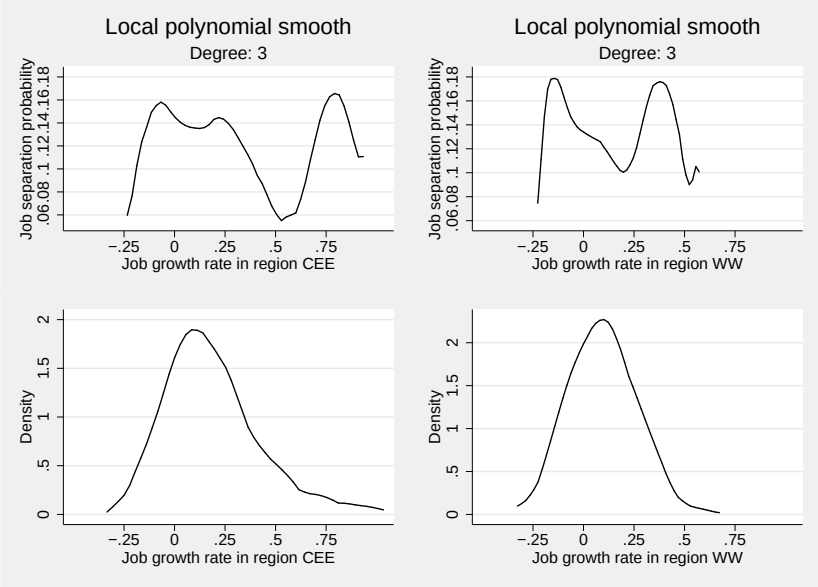
Source: MIDI, MARKUS and BA 1999-2001. German manufacturing MNEs with presence in Central and Eastern Europe (CEE) and worldwide (WW), and non-MNEs. On average across manufacturing sectors, worker separation rates are 14% both at MNEs with presence in CEE and worldwide, and 18% at non-MNEs.

Figure 1: Domestic worker separations from MNEs and non-MNEs

rates, MNEs active in CEE countries do not differ much from the MNE average. Figure 1 shows that this pattern is largely preserved across main manufacturing industries. We single out the German food and textiles sector, which is commonly perceived to be a declining industry with a comparative disadvantage relative to Germany's trading partners, and the German machinery and equipment sector, which is generally considered to manufacture at a comparative advantage. Quite expectedly for a comparative disadvantage sector, domestic worker separation rates in absolute terms are considerably higher in the food and textiles sector than in other manufacturing industries. But the difference in worker separation rates between MNEs and non-MNEs in that sector stands at a striking seven percent and is considerably larger than in the other manufacturing industries. In contrast to public perception, separation rates are lower at MNE establishments than at non-MNE establishments.

One hypothesis, consistent with these stylized facts, is that globalization in broad terms—including import competition and cross-firm cross-border trade in intermediate goods—tends to displace more workers in Germany's disadvantaged sectors such as food and textiles but that MNEs who successfully expand abroad manage to secure considerably lower worker separation rates, close to those in manufacturing sectors with a comparative advantage. An alternative hypothesis is that a subset of highly competitive German enterprises, in the food and textiles sector as well as in other industries, tend to expand abroad while simultaneously retaining more workers at home.

Foreign employment expansions and domestic worker separations. An instructive nonparametric tool to relate domestic worker separation rates to foreign employment changes is local polynomial regression—a natural extension of local mean



Source: MIDI, MARKUS and BA 1999-2001, manufacturing sectors. Upper panel: Results from local polynomial regressions of domestic worker separation rates between 2000 and 2001 on foreign employment changes between 1999 and 2000 using third-order polynomials, an Epanechnikov kernel and bandwidth .1. Lower panel: Density estimates of foreign employment changes between 1999 and 2000 using an Epanechnikov kernel and bandwidth .1.

Figure 2: Local polynomial regressions of worker separation rates on FDI expansions

smoothing in the spirit of the Nadaraya-Watson estimator. Consider the model

$$y_i = \theta(x_i), \tag{1}$$

where y_i is worker separation, taking a value of one iff the holder of job i is displaced through a layoff or quit between t and $t+1$. We omit time subscripts to save on notation. θ is an unknown function of the predictor variable x_i. For this nonparametric regression, we use as predictor x_i the exposure of job i to changes in its parent MNE's foreign-affiliate employment between $t-1$ and t (note the one-year lag between foreign-expansion and worker separation).

In our case, local polynomial regression involves fitting the dependent variable (domestic worker separation rates) to a univariate polynomial form of the regressor (foreign employment changes) using locally weighted least squares. Compared to the Nadaraya-Watson estimator (which is a special case of local polynomial smoothing with a polynomial of degree zero), local polynomials of higher order exhibit preferable bias properties. For a comprehensive overview of local polynomial smoothing see Fan and Gijbels (1996).

In our local polynomial estimation, we drop the first and last job growth deciles to exclude outliers from our estimation sample. We vary the bandwidths, experiment

with alternative kernels, and consider polynomials of varying degrees including the Nadaraya-Watson estimator itself. The basic shape of the domestic worker separation curve, with a negative slope in the range of the highest foreign expansion densities and a positive slope at large but infrequent rates of foreign employment expansions, is strikingly similar across specifications.

Figure 2 depicts local polynomial regression estimates for CEE and WW. The estimates are based on a third-order polynomial with an Epanechnikov kernel and bandwidth .1. Domestic worker separation rates are falling at MNEs with FDI (foreign employment) expansions of up to 50 percent in CEE and of up to 20 percent WW, but worker separation rates exhibit a marked increase at MNEs with FDI expansions beyond 50 and 20 percent, respectively.

We present according density estimates for the frequency of foreign employment expansions below the local polynomial regression estimates in Figure 2. The bulk of foreign employment expansions lies roughly between -10 and 25 percent in CEE and WW. In these ranges, where the prediction of domestic worker separation rates is more precisely estimated, domestic worker separation rates are falling with FDI both in CEE and WW. In CEE, domestic worker separation rates exhibit a local maximum (at close to 16 percent) for small foreign workforce contractions (in the neighborhood of no foreign employment change) and a minimum (at 6 percent) for 50-percent foreign workforce expansions. Note, however, that large rates of foreign employment change seldom occur at MNEs between 1999 and 2000. Over the range of foreign employment growth rates that are most dominant (between -10 percent and 25 percent say), domestic separation rates decrease with increases in foreign job growth rates. A similar pattern arises for expansions worldwide, but the average level of domestic worker separation rates is somewhat higher and the minimum occurs at foreign employment expansions of around 20 percent.

A negative slope in the range of the highest foreign expansion densities is consistent with the idea that the bulk of FDI expansions is associated with lower worker separation rates, and more frequent worker retentions, at the expanding MNEs. A positive (but imprecisely estimated) slope at large rates of foreign employment expansions might suggest that domestic jobs become less secure at firms with substantial foreign workforce buildups. The illustrative results from the univariate nonparametric local-polynomial regressions deserve more scrutiny, however, for they do not condition on worker, firm or sector characteristics.

MNEs differ from non-MNEs regarding their establishment and work force characteristics. Table 4 displays summary statistics for our main sample of workers in the manufacturing sector, separately for MNE and non-MNE establishments. Workers in MNE establishments earn more, are more highly educated, more likely to be white-collar workers, and less likely to be part-time employed than workers in non-MNE establishments. MNE establishments are bigger on average than non-MNE establishments. Median employment is 644 and 103 for MNE and non-MNE establishments, respectively.

In summary, descriptive evidence suggests that, first, German MNEs with a pres-

Table 4: Descriptive statistics: MNE and non-MNE subsamples

	MNE		non-MNE	
	mean	s.dev.	mean	s.dev.
Worker-level variables				
Indic.: Worker separation	.14	.34	.18	.38
Age	41.01	10.44	40.69	11.77
Female	.23	.42	.33	.47
More than upper-secondary schooling	.16	.37	.08	.28
Annual wage in EUR	35,317.8	11,611.6	26,847.8	13,872.2
Job-level variables				
White-collar job	.44	.50	.38	.49
Current apprentice	.02	.15	.04	.19
Part-time employed	.05	.21	.12	.33
Establishment-level variables				
Employment at domestic establishment	2,683.8	7,935.3	926.9	3,153.3
Indic.: Establishment in East Germany	.09	.29	.10	.30
Number of observations	38,046		55,101	

Sources: Linked MIDI and BA data, $t = 2000$. 5% random sample of workers in FDI exposed and non-FDI exposed manufacturing establishments.

ence in CEE or anywhere worldwide exhibit a four percentage point lower rate of worker separations than German non-MNEs in manufacturing industries. Second, while absolute worker separation rates are higher in comparative disadvantage sectors, such as food and textiles, the drop in domestic worker separation rates is also larger (around seven percent) for MNEs in those sectors as compared to non-MNEs. Considering, third, the varying degree of foreign employment expansions at MNEs, univariate nonparametric regressions suggest that foreign employment expansions are associated with drops in domestic worker separation rates for the bulk of FDI expansions. Fourth, however, the workforce composition of MNEs and non-MNEs is quite different, and so are other establishment characteristics. To further explore the relationship between foreign job growth and domestic worker separation, we proceed to parametric multivariate regression.

4 Parametric Regressions

In parametric multivariate regression analysis, we investigate the linear effect of FDI expansions abroad on an individual worker's separation chance from an MNE's home establishment, conditional on worker, job, establishment and sector characteristics, including past levels of MNE activity. FDI expansions (positive changes to FDI exposure) are the natural counterpart to separation as a job-level measure of changes in labor demand. We choose to contrast changes in worker separation rates with changes in foreign presence, rather than levels with levels, mostly because the descriptive evidence

suggests that MNEs and domestic firms differ markedly *ex ante*.

For parametric multivariate regression, we specify a linear relationship

$$y_i = \alpha + x_i\beta + \mathbf{z}_i'\gamma + \epsilon_i, \tag{2}$$

where y_i is worker separation, taking a value of one iff the holder of job i is displaced through a layoff or quit between t and $t+1$, x_i is a measure of job i's exposure to FDI changes between $t-1$ and t, and $\mathbf{z}_i$ is a comprehensive vector of worker, job, establishment and sector characteristics prior to the foreign employment change in year $t-1$, and ϵ_i is a disturbance. Note the one-year lag between the foreign expansion predictor and other covariates on the one hand, and the dependent worker separation variable on the other hand. We omit time subscripts to save on notation.

We consider two alternative measures of changes to a job's FDI exposure x_i. We begin with the binary foreign-expansion indicator of an employment expansion at job i's parent MNE's foreign affiliates. This variable has two advantages: its construction does not require any weighting by ownership; and its coefficient in a linear regression provides an estimate of the mean difference in separation rates between expanding and non-expanding firms, comparable to the four-percent mean difference in separation rates between MNEs and non-MNEs. Then we turn to the same continuous predictor as in our nonparametric regression in the preceding section: the exposure of job i to changes in its parent MNE's foreign-affiliate employment. This variable reflects growth in head counts of foreign employment, but also changes in the enterprise's ownership share of the domestic FDI-reporting firm as well as in that FDI-reporting firm's ownership of the foreign affiliates.

An obvious concern with our specification is that the assumption of an independently distributed disturbance ϵ_i might be violated, despite our conditioning on a comprehensive set of pre-expansion characteristics and despite the time lag between foreign employment expansions and the dependent variable. This can obstruct interpretation of the β coefficient. We therefore estimate the linear probability model (2) both with ordinary least squares (OLS) and with a two-stage instrumental-variable (IV) approach based on lagged regressors.[11] In predicting an MNE's foreign employment expansion $\hat{x}_i$ at $t-1$ with its past expansion at $t-2$, we can limit otherwise potentially confounding effects. The instrumentation strategy renders it implausible that a temporary coincidence of foreign expansions and increased home worker retention rates affect the results, or that transitory firm-level shocks that drive both foreign employment expansions and home worker retentions explain our estimates. An MNE's permanent gain in competitive advantage, however, may positively affect both past and current employment expansions at foreign affiliates as well as domestic workers retentions, and cannot

[11] Nonlinear limited dependent variable estimators, such as logit or probit, for instance, do not permit instrumental-variable corrections for the potential simultaneity of predictors. When compared to our uncorrected OLS estimates, however, logit and probit estimates are similar to the linear probability model. We discuss additional candidate instruments below. In general, exogenous firm-level instruments that are not related to MNE performance and thus not to worker separation disturbances but do covary with FDI expansions are hard to construe.

be ruled out with this firm-level instrumentation strategy. Host-country characteristics such as sector-level capital utilization rates or GDP are sometimes considered for instrumentation (Desai, Foley and Hines 2005), but they can suffer from similar drawbacks as firm-level instruments. If the MNE's expansion into a low-utilization sector abroad, or into a high-GDP host location, is more likely for an MNE with an inherent competitive advantage, then capital utilization or GDP cannot serve as instruments to remove the correlation with simultaneous home-worker retentions.

Based on the descriptive statistics in Section 3, we expect β to have a negative sign. As stressed before, at least two alternative hypotheses are consistent with this prior. FDI expansions may contribute to an MNE's worldwide performance and help secure domestic jobs. Alternatively, MNEs that are more competitive for FDI-unrelated reasons may expand employment both abroad and at home. If the IV estimate of β is larger in absolute value (more negative) than the plain OLS estimate, then the plausibility of the latter alternative hypothesis is arguably more compromised than the former main hypothesis. The reason is that an MNE's persistent competitive advantage over two periods should typically result in stronger employment expansions both abroad and at home in earlier periods than in later periods because they would be associated with permanent increase in workforce size. So, the IV estimate should reduce and not reinforce the employment effect and result in a smaller absolute value of β under the alternative hypothesis. We expect the opposite under the former main hypothesis that an MNE's FDI expansion itself helps secure domestic jobs. Persistent foreign expansions under this main hypothesis should have a cumulative positive effect on domestic worker retentions and thus augment β in absolute value.

OLS estimation with foreign-expansion indicators for CEE. Table 5 presents OLS estimates of equation (2), with gradually enriched specifications for FDI expansions in Central and Eastern Europe. The indicator of a job's exposure to a foreign employment expansion at the MNE is significantly negatively correlated with a domestic worker separation. So, in line with the prediction from univariate nonparametric regressions in the preceding Section 3, MNEs that expand abroad displace domestic workers less frequently.

We start with worker characteristics as control variables. Column 1 shows results from a regression including only the worker characteristics. Older workers suffer fewer separations but their separation risk drops at a less-than-proportional rate as they age. High-wage workers experience significantly fewer displacements, but workers with more than secondary schooling experience more frequent separations—controlling for the characteristics of the jobs they fill. There is no statistically detectable difference between female and male workers in displacement risks once their remaining individual characteristics and job covariates are taken into account. Similar to more than secondary-schooled workers, workers in white-collar jobs exhibit more frequent separations. Recall that some separations may be voluntary quits. Workers in part-time jobs, or apprenticeship positions face lower separation rates, as do workers in minor employments, whereas workers in temporary work suffer higher separation rates. These

Table 5: OLS Worker-Separation Estimates for FDI Expansions in CEE

	Specification			
	(1)	(2)	(3)	(4)
Indic.: Employment growth in CEE	-.023 (.003)***	-.018 (.003)***	-.016 (.003)***	-.016 (.003)***
Worker-level variables				
Age	-.026 (.0008)***	-.026 (.0008)***	-.026 (.0008)***	-.026 (.0008)***
Age squared	.029 (.0009)***	.029 (.0009)***	.029 (.0009)***	.030 (.0009)***
log Wage	-.086 (.003)***	-.086 (.005)***	-.086 (.005)***	-.104 (.007)***
Indic.: Female	.0001 (.003)	-.004 (.003)	-.003 (.003)	-.002 (.003)
Indic.: More than upper-sec. schooling	.042 (.004)***	.037 (.004)***	.037 (.004)***	.036 (.004)***
Job-level variables				
Indic.: White-collar job	.028 (.003)***	.020 (.003)***	.020 (.003)***	.019 (.003)***
Indic.: Minor employment	-.085 (.009)***	-.078 (.011)***	-.078 (.011)***	-.078 (.011)***
Indic.: Temporary job	.038 (.013)***	.045 (.013)***	.046 (.013)***	.044 (.013)***
Indic.: Apprentice	-.121 (.015)***	-.135 (.015)***	-.136 (.015)***	-.132 (.015)***
Indic.: Part-time job	-.047 (.006)***	-.047 (.006)***	-.047 (.006)***	-.046 (.006)***
Establishment-level variables				
Employment		-1.93e-06 (2.25e-07)***	-2.31e-06 (2.41e-07)***	6.97e-07 (4.99e-07)
Average workforce age		-.0008 (.0004)**	-.0003 (.0004)	-.0005 (.0004)
FE from Mincer log wage regression		-.043 (.014)***	-.050 (.014)***	-.051 (.014)***
Annual average wage in EUR		.00002 (6.97e-06)***	.00003 (7.24e-06)***	.00003 (7.27e-06)***
Share: Females		.027 (.009)***	.020 (.010)**	.019 (.010)*
Share: More than upper-sec. schooling		.033 (.016)**	.011 (.016)	.019 (.016)
Share: Minor employments		-.005 (.018)	.013 (.019)	.015 (.019)
Share: Temporary job		-.077 (.049)	-.098 (.050)*	-.084 (.050)*
Share: White-collar jobs		.018 (.009)**	.022 (.009)**	.020 (.009)**
Share: Apprentices		.163 (.051)***	.202 (.052)***	.191 (.052)***
Share: Part-time jobs		.014 (.016)	.013 (.016)	.020 (.016)
Indic.: Loc. in East Germany		-.012 (.005)**	-.009 (.005)*	-.008 (.005)*
Sector-level trade variables	no	no	yes	yes
Lagged log Wage				.020 (.005)***
Lagged Employment				-6.44e-06 (9.35e-07)***
Obs.	93,147	93,142	93,142	93,142

Sources: Linked MIDI and BA data, $t = 2000$. 5% random sample of workers in FDI exposed and non-FDI exposed manufacturing plants. Controlling for lagged levels of MNE employment in all world regions. Standard errors in parentheses: * significance at ten, ** five, *** one percent.

worker-level coefficients remain remarkably similar across specifications even as we add employer and sector-level controls, and a worker's lagged log wage.

Specification 2 adds establishment characteristics, including the establishment-fixed component in German wages from a Mincer (1974) regression to proxy for establishment-level differences in productivity. Specification 3 adds sector-level measures of German foreign trade: exports, imports of final goods and imports of intermediate inputs. Finally, specification 4 adds lagged values of wages and establishment size. Note that in all specifications, we also control for lagged levels of MNE employment in all world regions.

The negative coefficient on the foreign employment expansion indicator gradually drops in absolute value as we proceed to richer specifications by adding establishment and sector covariates, from a coefficient of -.023 to -.016 between specifications 1 and 4. So, an FDI expansion predicts between 1.6 and 2.3 percentage points lower separation rates at the expanding MNE compared to non-expanding MNEs or domestic enterprises. The pattern of coefficient drops in absolute value suggests that a part of the lower domestic worker separation rates at MNEs may be related to employer heterogeneity, such as superior MNE performance that can lead to workforce expansions across all MNE locations, and not only to FDI expansions themselves. The negative coefficient on the FDI expansion indicator remains highly significant across all specifications, however. So, the hypothesis that FDI expansions themselves contribute to MNEs' lower domestic worker separations in the wake of globalization cannot be rejected in any specification. In fact, the small changes in the coefficient estimate between specifications 2 and 4, together with the overwhelming significance of the coefficient, make this hypothesis appear plausible.

The coefficients on establishment covariates are similar across specifications but, in the presence of worker and job-level controls, only some are statistically significant at conventional levels. Establishment employment is negatively related to worker separations: workers at larger establishments experience fewer separations. Similarly, workers at high-wage establishments (read high-productivity establishments) experience fewer separations. To identify high-wage establishments, we measure the establishment component in log wages in a Mincer (1974) controlling for all observable worker and job characteristics. Average annual wages exhibit the opposite, statistically significant positive, coefficient. So, separation rates are higher at establishments with high-wage workers. Similarly, separation rates are higher at establishments with a larger fraction of white-collar jobs. The latter two estimates are in line with similar worker- and job-level coefficients on higher education and white-collar occupations. Workers at establishments with higher shares of apprentices suffer more separations.

Inclusion of lagged variables in specification 4 hardly alters any of the prior coefficients. A worker's lagged wage is significantly positively associated with the worker's separation risk, contrary to the negative association of the concurrent wage. Including the lagged log wage increases the coefficient of the concurrent log wage in absolute value from -.08 to -.10, that is by the size of the lagged log wage coefficient itself. Lagged establishments employment takes over as the significantly negative establish-

ment size predictor when included, whereas in specifications 2 and 3 exclusion of lagged employment resulted in a negative and significant coefficient on current establishment size.

IV estimation with foreign-expansion indicators for CEE. Despite our comprehensive list of worker, job, employer and sector covariates, OLS estimates do not necessarily control temporary and unobserved firm-level shocks that simultaneously affect foreign employment expansions and domestic worker separation rates. We consider past employment expansions as firm-level instruments to remove confounding effects of transient firm-level shocks. On the first stage of our two-stage IV regression, past realizations of the FDI expansion indicator turn out to be highly significant predictors of the current FDI expansion indicator.

Table 6 presents the results from IV estimation under the same four specifications as OLS estimation (Table 5). While coefficients on worker, job, employer and sector covariates hardly differ, there is a remarkable increase in the absolute value of the foreign-expansion coefficient. In specification 1 the coefficient moves from -.023 with OLS to -.035 with IV, and in specification 4 from -.016 to -.026. The consistency of this pattern across specifications is suggestive of the plausibility of our main hypothesis that FDI expansions themselves facilitate worker retentions at MNE establishments in Germany.

As argued above, we would typically expect the opposite finding under the main alternative hypothesis that unobserved MNE shocks drive both foreign and home employment expansions. Under that alternative hypothesis a positive MNE performance shock should result in strong expansions both in foreign and home employment at impact so that we would expect a smaller foreign-expansion coefficient in absolute value under IV than under OLS. The opposite is the case. By design, the IV estimator cannot conclusively reject the hypothesis that permanent firm-level shocks drive both foreign expansions and home-worker retentions. But, at the very least, our main hypothesis is fully consistent with the IV estimates. MNEs with persistent foreign employment expansions exhibit systematically stronger covariation between FDI expansions and reduced domestic worker separation rates than MNEs whose FDI expansions are not as well predicted by past FDI expansions.

OLS and IV estimation with indicators for worldwide FDI expansions. Looking beyond CEE to FDI expansions worldwide yields even more striking results as Table 7 shows. Coefficients on worker, job, employer and sector variables exhibit patterns similar to the regressions for expansions in CEE. To reduce duplication, we therefore only report worker and job coefficients. The OLS estimates—for specification 1 with only worker and job variables (column 1), and for specification 4 with worker, job, employer and sector variables (column 2)—are about the same worldwide as in CEE, even for the foreign employment growth indicator. Most strikingly, however, the IV estimates now almost double the OLS coefficients on the FDI expansion indicator in absolute value (columns 3 and 4). Under the most comprehensive specifi-

Table 6: IV Worker-Separation Estimates for FDI Expansions in CEE

	Specification			
	(1)	(2)	(3)	(4)
Indic.: Employment growth in CEE	-.035 (.005)***	-.028 (.005)***	-.025 (.005)***	-.026 (.005)***
Worker-level variables				
Age	-.026 (.0008)***	-.026 (.0008)***	-.026 (.0008)***	-.026 (.0008)***
Age squared	.029 (.0009)***	.029 (.0009)***	.029 (.0009)***	.030 (.0009)***
log Wage	-.084 (.003)***	-.086 (.005)***	-.086 (.005)***	-.104 (.007)***
Indic.: Female	.0002 (.003)	-.004 (.003)	-.003 (.003)	-.002 (.003)
Indic.: More than upper-sec. schooling	.043 (.004)***	.037 (.004)***	.037 (.004)***	.036 (.004)***
Job-level variables				
Indic.: White-collar job	.028 (.003)***	.020 (.003)***	.020 (.003)***	.019 (.003)***
Indic.: Minor employment	-.082 (.009)***	-.078 (.011)***	-.078 (.011)***	-.078 (.011)***
Indic.: Temporary job	.039 (.013)***	.045 (.013)***	.046 (.013)***	.044 (.013)***
Indic.: Apprentice	-.120 (.015)***	-.135 (.015)***	-.136 (.015)***	-.132 (.015)***
Indic.: Part-time job	-.046 (.006)***	-.047 (.006)***	-.047 (.006)***	-.046 (.006)***
Establishment-level variables				
Employment		-1.80e-06 (2.29e-07)***	-2.23e-06 (2.43e-07)***	8.06e-07 (5.01e-07)
Average workforce age		-.0008 (.0004)**	-.0004 (.0004)	-.0005 (.0004)
FE from Mincer log wage regression		-.044 (.014)***	-.050 (.014)***	-.052 (.014)***
Annual average wage in EUR		.00002 (7.01e-06)***	.00003 (7.28e-06)***	.00003 (7.30e-06)***
Share: Females		.028 (.009)***	.021 (.010)**	.020 (.010)*
Share: More than upper-sec. schooling		.033 (.016)**	.012 (.016)	.020 (.016)
Share: Minor employments		-.003 (.018)	.014 (.019)	.016 (.019)
Share: Temporary job		-.082 (.049)*	-.101 (.050)**	-.087 (.050)*
Share: White-collar jobs		.017 (.009)*	.022 (.009)**	.019 (.009)**
Share: Apprentices		.167 (.051)***	.204 (.052)***	.194 (.052)***
Share: Part-time jobs		.015 (.016)	.014 (.016)	.020 (.016)
Indic.: Loc. in East Germany		-.011 (.005)**	-.008 (.005)	-.007 (.005)
Sector-level trade variables	no	no	yes	yes
Lagged log Wage				.020 (.005)***
Lagged Employment				-6.50e-06 (9.35e-07)***
Obs.	93,147	93,142	93,142	93,142

Sources: Linked MIDI and BA data, $t = 2000$. 5% random sample of workers in FDI exposed and non-FDI exposed manufacturing plants. Controlling for lagged levels of MNE employment in all world regions. Standard errors in parentheses: * significance at ten, ** five, *** one percent.

Table 7: Worker-Separation Estimates for FDI Expansions Worldwide

	OLS		IV	
	(1)	(2)	(3)	(4)
Indic.: Employment growth *worldwide*	-.022 (.003)***	-.018 (.003)***	-.041 (.005)***	-.037 (.006)***
Worker-level variables				
Age	-.026 (.0008)***	-.026 (.0008)***	-.026 (.0008)***	-.026 (.0008)***
Age squared	.029 (.0009)***	.030 (.0009)***	.029 (.0009)***	.030 (.0009)***
log Wage	-.086 (.003)***	-.104 (.007)***	-.082 (.004)***	-.103 (.007)***
Indic.: Female	.0002 (.003)	-.002 (.003)	.0005 (.003)	-.002 (.003)
Indic.: More than upper-sec. schooling	.042 (.004)***	.036 (.004)***	.043 (.004)***	.036 (.004)***
Job-level variables				
Indic.: White-collar job	.028 (.003)***	.019 (.003)***	.028 (.003)***	.019 (.003)***
Indic.: Minor employment	-.084 (.009)***	-.078 (.011)***	-.079 (.010)***	-.077 (.011)***
Indic.: Temporary job	.039 (.013)***	.044 (.013)***	.041 (.013)***	.044 (.013)***
Indic.: Apprentice	-.121 (.015)***	-.132 (.015)***	-.120 (.015)***	-.132 (.015)***
Indic.: Part-time job	-.047 (.006)***	-.046 (.006)***	-.046 (.006)***	-.046 (.006)***
Establishment-level variables	no	yes	no	yes
Sector-level trade variables	no	yes	no	yes
Lagged log Wage		.020 (.005)***		.020 (.005)***
Obs.	93,147	93,142	93,147	93,142

Sources: Linked MIDI and BA data, $t = 2000$. 5% random sample of workers in FDI exposed and non-FDI exposed manufacturing establishments. Controlling for lagged levels of MNE employment in all world regions in columns 1 through 4, additionally controlling for employer and sector covariates in columns 2 and 4. Standard errors in parentheses: * significance at ten, ** five, *** one percent.

cation (column 4), a foreign expansion anywhere worldwide predicts a 3.7 percent lower domestic worker separation rate—this prediction is almost equal to the unconditional mean difference of four percent in separation rates between MNEs and non-MNEs (Table 4).

Additional IV results. We explore additional instrumental variables to assess the robustness of results. Table 8 reports the OLS and IV estimates from before (in columns 1 and 2) and assembles alongside results from specifications with additional instrumental variables (in columns 3 through 6). Including the past foreign capital-stock growth as an additional firm-level instrument for recent employment growth (column 3) neither significantly alters the point estimates nor does the specification improve efficiency. Similarly, we notice no significant change in point estimates or efficiency when we use turnover, an output proxy, instead of input-related instrumental

Table 8: Additional IV Estimates for FDI Expansions

	OLS	IV				
	(1)	(2)	(3)	(4)	(5)	(6)
Indic.: Employment growth in CEE	-.023 (.003)***	-.026 (.005)***	-.021 (.005)***	-.020 (.006)***	-.029 (.005)***	-.287 (.060)***
Indic.: Employment growth *worldwide*	-.041 (.003)***	-.037 (.006)***	-.034 (.005)***	-.030 (.006)***	-.042 (.006)***	-.276 (.057)***
Instruments (for CEE or WW)						
Past employment growth		yes	yes		yes	
Past capital-stock growth			yes			
Past turnover growth				yes		
Headquarters in *Land* with CEE border					yes	yes
Obs.	93,147	93,142	93,140	93,140	93,140	93,140

Sources: Linked MIDI and BA data, $t = 2000$. 5% random sample of workers in FDI exposed and non-FDI exposed manufacturing establishments. lagged levels of MNE employment in all world regions, employer and sector covariates. Standard errors in parentheses: * significance at ten, ** five, *** one percent.

variables (column 4).

A firm's proximity to CEE can reduce the cost of managing foreign affiliates in CEE and be associated with more frequent expansions in CEE. This reasoning suggests that a dummy for a firm's headquarters in a CEE-bordering *Land* (German federal state) can serve as an instrumental variable.[12] Use of the CEE-proximity dummy alongside the past foreign employment expansion for instrumentation does not significantly alter the point estimates or improve efficiency. Using the CEE-proximity dummy as the sole instrument, however, raises the point estimates to implausible absolute magnitudes, while preserving the negative sign. In summary, alternative instrumental-variable specifications never overturn and typically reinforce our prior findings.

Continuous foreign-expansion predictors. We finally turn to estimates of domestic worker separations using continuous foreign-expansion predictors: employment changes at foreign affiliates in CEE or anywhere worldwide. This type of parametric regression is most closely related to our illustrative nonparametric, but univariate, regression in Section 3. Just as before, worker, job, employer and sector variables exhibit results similar to the regressions using an FDI expansion indicator as main predictor. We therefore only report worker and job coefficients.

Table 9 shows the coefficient estimates. For FDI expansions in CEE, the continuous foreign-expansion predictor still exhibits its negative sign but the estimate is not significant at conventional levels. A possible reason is that there is a reversal from a negative relationship between domestic worker separations and foreign FDI expansions to a positive one for substantial foreign employment buildups—as observed under nonparametric univariate regression in Figure 2. A linear prediction reduces the relationship between foreign expansions and domestic worker separations to the sample mean relationship so that the negative and positive effects can cancel at the sample

[12]We thank an anonymous referee for this suggestion.

Table 9: Worker-Separation Estimates for Continuous Foreign Employment Changes

	CEE		WW	
	OLS	IV	OLS	IV
	(1)	(2)	(3)	(4)
Employment change in CEE/WW	-.0003	-.081	.006	-.216
	(.0003)	(.047)*	(.001)***	(.051)***
Worker-level variables				
Age	-.026	-.025	-.026	-.026
	(.0008)***	(.001)***	(.0008)***	(.0009)***
Age squared	.030	.029	.030	.030
	(.0009)***	(.001)***	(.0009)***	(.001)***
log Wage	-.104	-.098	-.104	-.100
	(.007)***	(.009)***	(.007)***	(.008)***
Indic.: Female	-.002	-.004	-.002	-.001
	(.004)	(.005)	(.004)	(.004)
Indic.: More than upper-sec. schooling	.037	.039	.037	.039
	(.004)***	(.006)***	(.004)***	(.005)***
Job-level variables				
Indic.: White-collar job	.019	.022	.019	.019
	(.003)***	(.005)***	(.003)***	(.004)***
Indic.: Minor employment	-.077	-.070	-.077	-.074
	(.011)***	(.015)***	(.011)***	(.013)***
Indic.: Temporary job	.043	.046	.041	.032
	(.013)***	(.017)***	(.014)***	(.016)**
Indic.: Apprentice	-.131	-.118	-.129	-.112
	(.015)***	(.021)***	(.016)***	(.019)***
Indic.: Part-time job	-.047	-.042	-.045	-.044
	(.007)***	(.009)***	(.007)***	(.008)***
Establishment-level variables	yes	yes	yes	yes
Sector-level trade variables	yes	yes	yes	yes
Lagged log Wage	.020	.019	.020	.020
	(.005)***	(.007)***	(.005)***	(.006)***
Obs.	92,090	90,623	91,943	90,899

Sources: Linked MIDI and BA data, $t = 2000$. 5% random sample of workers in FDI exposed and non-FDI exposed manufacturing establishments. Controlling for lagged levels of MNE employment in all world regions and for employer and sector covariates. Standard errors in parentheses: * significance at ten, ** five, *** one percent.

mean. The difference in the point estimates between OLS and IV still exhibits the same pattern as in the preceding CEE regressions with a binary FDI expansion predictor. The negative correlation between employment changes at foreign affiliates in CEE and domestic worker separations becomes stronger.

For worldwide FDI expansions, OLS estimation with the continuous foreign-expansion predictor results in a statistically significant reverse (positive) sign, contrary to any prior finding and our expectations. Once we turn to IV, however, the negative sign on the foreign-expansion predictor returns. In light of our preceding findings, this sign reversal between OLS and IV is striking and suggests that the mean MNE's current unobserved characteristics tend to be associated with both higher domestic separation rates and stronger foreign-employment expansions but that these current unobserved characteristics do not covary with past foreign-employment expansions in the same systematic way.

Discussion. Across regression approaches, specifications and sample regions, we find a statistically significant negative relationship between FDI expansions and domestic worker separations. The predicted negative association corroborates the unconditional difference in mean worker separation rates between MNEs (with a 14% mean separation rate) and non-MNEs (18% separation rate). IV estimates, from predicting FDI expansions with past FDI expansions of the same MNE, confirm the significantly negative relationship between FDI expansions and domestic worker separations with considerably larger point estimates in absolute value.

An indicator variable for FDI expansions in CEE, or anywhere worldwide, predicts a statistically significant mean difference in displacement rates between FDI-expanding and non-FDI expanding firms ranging from 1.6 (OLS) to 2.6 (IV) percentage points for CEE expansions, and from 1.8 to 3.7 percentage points for expansions anywhere worldwide. So, FDI expansions are associated with a significant portion of the difference in worker separation rates—conditional on a comprehensive set of worker, job, employer, and sector covariates.

As mentioned at the outset of this chapter, several explanations are consistent with our findings. Vertical foreign expansions that fragment the production process can lead to cost savings, increased world-wide market shares, and domestic employment growth. Similarly, horizontal expansions that duplicate production at foreign locations can lead to improved market access with potentially beneficial consequences for home employment. Complementarities between foreign and home employment can give rise to our findings. Moreover, foreign expansions may signal attractive career paths to domestic workers, reduce worker quits, and increase retention rates. The stability of trade relationships within MNEs may stabilize home employment. Further research is needed, however, to discern with confidence this set of explanations from the competing hypothesis that FDI-unrelated firm-level shocks drive the results. In ongoing research, we apply propensity-score matching to compare differences in worker separation between FDI-expanding and non-expanding firms. Linked employer-employee data are particularly well suited for treatment estimators of this kind because the decision-making unit, the FDI-reporting firm, is empirically distinct from the unit under treatment, the individual job.

5 Conclusion

This chapter documents a novel linked employer-employee dataset for German multinational enterprises (MNEs) and compares MNEs that expand their employment at foreign affiliates to both MNEs with no foreign workforce expansion and domestic firms. Between 1991 and 2001, the fastest buildup in foreign employment at German MNEs occurred in Central and Eastern Europe, where total employment rose from 46 thousand employees in 1991 to around 670 thousand in 2001—an employment level in 2001 almost as large as that of all developing-country workforces at German MNEs combined. The large majority of foreign-affiliate employees work in manufacturing

industries, on which we focus the analysis.

The global integration of economies has marked labor-market consequences, changing relative skill demands in developing countries (see chapter 10) and the employment allocation within multinational enterprises (Muendler and Becker 2006). But, contrary to wide-held perceptions, multinational enterprises offer more stable jobs at their industrial-country home locations and exhibit lower worker separation rates than their competitors without foreign expansions do: the unconditional worker separation rate at German MNEs is four percent lower than at non-MNEs in Germany. Nonparametric regressions illustrate that foreign-employment expansions are associated with lower worker separation rates in the range of the most frequent foreign-employment changes. Multivariate linear regressions show that an indicator of foreign employment expansions in CEE significantly predicts 1.6 to 2.6 percentage-point lower domestic worker separation rates, depending on the regression specification. The indicator of worldwide workforce expansions is an even stronger predictor.

Linked employer-employee data allow us to condition on a comprehensive set of worker, job, employer and sector covariates. Using lagged foreign expansions to predict current expansions in an instrumental-variable approach raises the point estimates in absolute value. It nevertheless remains a task for future research to conclusively discern whether the results are best explained by competitive MNEs, who simultaneously expand their foreign workforce and retain more domestic workers, or by the foreign expansion itself, which may help the MNE secure domestic jobs through cost savings or foreign market access. Irrespective of the causal explanation, however, there is no empirical evidence on domestic job security that would justify interventions to hinder the foreign expansion of MNEs. To the contrary, our findings are consistent with the idea that preventing domestic MNEs from exploiting international factor-cost differentials in house, or hampering MNEs' access to foreign product markets through FDI, would increase domestic worker separations at MNEs.

Appendix

A Linked employer-employee data

We link jobs to their FDI exposure throughout German corporate groups. This requires a two-step procedure. First, we identify all MIDI firms that are in the commercial company structure database MARKUS. Departing from the MIDI firms in MARKUS, we move both down and up in the corporate hierarchy of MARKUS to select the affiliates and ultimate parents of the MIDI firms. Second, we string-match all domestic establishments in the BA worker database to the so-selected MARKUS firms for identification of all establishments related to *FDI firms*. We also string-match the domestic establishments to MIDI itself for identification of all those FDI reporting firms that are not part of a corporate group (but stand-alone firms).

We link the data based on names and addresses. By law, German establishment names must include the firm name (but may by augmented with qualifiers). Before we start the string-matching routine, we remove clearly unrelated qualifiers (such as manager names or municipalities) from establishment names, and non-significance bearing components from establishment and firm names (such as the legal form) in order to compute a link-quality index on the basis of highly identifying name components. Our string-matching is implemented as a Perl script and computes link-quality indices as the percentage of words that coincide between any pair of names. We take a conservative approach to avoid erroneous links. We keep two clearly separate subsets of the original data: First, establishments that are perfect links to MARKUS or MIDI, i.e. establishment names that agree with firm names in every single letter. Second, establishments that are perfect non-links, i.e. establishment names that have no single word in common with any FDI-related MARKUS or MIDI firm. We drop all establishments with a link-quality index between zero and one from our sample, i.e. establishments whose name partially corresponds to an FDI firm name but not perfectly so. Those establishments cannot be told to be either foreign-expansion or control establishments without risk of misclassification.[13] The procedure leaves us with a distinct foreign-expansion group of FDI establishments and a control group of non-FDI establishments.

The BA establishment name file is from November 2002 and contains names of establishments that are no longer active so that we include exiting and entering establishments. To capture exits after 1999 is particularly important for us, because one margin of separation is establishment closure. Firm names in the MARKUS database are from three vintages of data, November 2000, November 2001 and November 2002. This is to make sure that in case of name changes in one of the years 2000 through 2002, we do not miss string-matches.

Our procedure is designed to remove laterally related firms (sisters, aunts, or nieces) from the sample so that they neither enter the foreign-expansion nor the control group.

[13]The string-matching routine runs for several weeks, checking 3.8 million establishments against 65,000 *FDI firms*. It is infeasible to manually treat possible links with imperfect link-quality rates.

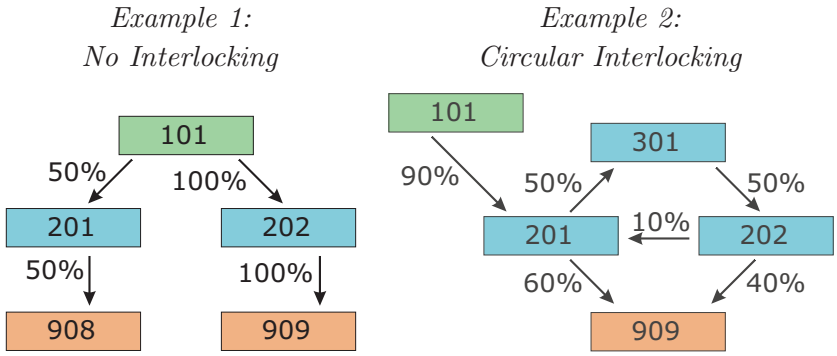


Figure 3: **Examples of Corporate Groups**

Take Example 1 of Figure 3 and consider firm 201 to be the FDI-conducting (and FDI-reporting) firm in the depicted corporate group. The first step of our procedure identifies firm 201 in MARKUS and its affiliate and parent 908 and 101 but does not identify firms 202 (a sister to 201) and 909 (a niece to 201). If any name component of establishments in firms 202 or 909 coincides with those of 101, 201 or 908 (but the establishment name is not an identical match to 101, 201 or 908), the establishments in firms 202 and 909 are discarded and neither enter the foreign-expansion nor the control group. If no single name component of establishments in firms 202 or 909 is the same as that of 101, 201 or 908, the establishment may enter our control group. If one considers sisters, aunts, and nieces with no single identical name component to be equally affected by FDI of firm 201 as those with common names or direct relations, their inclusion in the control group would make the control group more similar to the foreign-expansion group than it should be. If anything, however, the reduced difference would work against our worker separation estimates. Moreover, interlocking (of which Example 2 of Figure 3 is a special case) limits the number of only laterally related firms.

B Corporate ownership and FDI exposure

We infer the economically relevant ownership share of a domestic firm in any other domestic firm. The relevant ownership share can differ from the recorded share in a firm's equity for two reasons. First, a firm may hold indirect shares in an affiliate via investments in third firms who in turn control a share of the affiliate. We call ownership shares that sum all direct and indirect shares *cumulated* ownership shares. Second, corporate structures may exhibit cross ownership of a firm in itself via affiliates who in turn are parents of the firm itself. We call ownership shares that remove such circular ownership relations *consolidated* ownership shares. This appendix describes the procedure in intuitive terms; graph-theoretic proofs are available from the authors upon request.

Table 10: Ownership Inference

Affiliate-parent pair	Iteration (Length of Walk) 1	2	3	5	9	100
201-101	.9	.90	.900	.92250	.92306	.92308
201-202	.1					
201-301		.05		.00125		
202-101			.225	.22500	.23077	.23077
202-201		.25		.00625		
202-301	.5					
301-101		.45	.450	.46125	.46153	.46154
301-201	.5					
301-202		.05		.00125		
909-101		.54	.540	.64350	.64609	.64615
909-201	.6		.100		.00006	
909-202	.4	.06		.00150		
909-301		.20	.030	.00500	.00001	

Consolidation removes the degree of self-ownership (α) from affiliates, or intermediate firms between parents and affiliates, and rescales the ultimate ownership share of the parent to account for the increased control in partly self-owning affiliates or intermediate firms (with a factor of $1/(1-\alpha)$). Investors know that their share in a firm, which partly owns itself through cross ownership, in fact controls a larger part of the firm's assets and its affiliates' assets than the recorded share would indicate. In this regard, cross ownership is like self-ownership. Just as stock buy-backs increase the value of the stocks because investors' *de facto* equity share rises, so do cross-ownership relations raise the *de facto* level of control of the parents outside the cross-ownership circle.

We are interested in *ultimate* parents that are not owned by other domestic firms, and want to infer their *cumulated and consolidated* ownership in all affiliates. Consider the following example of interlocking (Example 2 in Figure 3). The ultimate parent with firm ID 101 holds 90 percent in firm 201, which is also owned by firm 202 for the remaining 10 percent. However, firm 201 itself holds a 25 percent stake in firm 202—via its holdings of 50 percent of 301, which has a 50 percent stake in 201. Firms 201 and 202 hold 60 percent and 40 percent of firm 909. Our cumulation and consolidation procedure infers the ultimate ownership of 101 in all other firms.

We assemble the corporate ownership data in a three-column matrix:[14] the first column takes the affiliate ID, the second column the parent ID, and the third column the effective ownership share. Table 10 shows this matrix for Example 2 in Figure 3

[14]We assemble cleared ownership data by first removing one-to-one reverse ownerships and self-ownerships in nested legal forms (such as *Gmbh & Co. KG*).

(the third column with the direct ownership share is labelled 1, representing the single iteration 1).

On the basis of this ownership matrix, our inference procedure walks through the corporate labyrinth for a prescribed number of steps (or iterations). The procedure multiplies the ownership shares along the edges of the walk, and cumulates multiple walks from a given affiliate to a given ultimate parent. Say, we prescribe that the algorithm take all walks of length two between every possible affiliate-parent pair (in business terms: two firm levels up in the group's corporate hierarchy; in mathematical terms: walks from any vertex to another vertex that is two edges away in the directed graph).

We choose the following trick to infer the *cumulated and consolidated* ownership for ultimate parents: We assign every ultimate parent a 100 percent ownership of itself. This causes the procedure to *cumulate and consolidate* the effective ownership share for all affiliates of ultimate parents, at any length of walks. There are seven distinct possibilities in the example to move in two steps through the corporate labyrinth. Table 10 lists these possibilities as iteration 2 (all entries in or below the second row). With our trick, there is now an eighth possibility to move from affiliate 201 to parent 101 in two steps because we have added the 101-101 loop with 100-percent ownership. As a result, our procedure cumulates ownerships of ultimate parents for all walks that are of length two or shorter. The procedure starts to consolidate shares as the length of the walk increases. Iteration 3 in Table 10 shows the cumulated and partially consolidated ownership of ultimate parent 101 in affiliate 201, for all three-step walks, including the first cycle from 201 through 202 and 301 back to 201 and then to 101.

In 2000, the maximum length of direct (non-circular) walks from any firm to another firm is 21. So, for all ultimate parents, the *cumulated and consolidated* ownership shares are reported correctly from a sufficiently large number of iterations on. Table 10 shows iteration 100. The ownership share of 101 in 201 has converged to the exact measure $(.9/(1-.1 \cdot .5 \cdot .5) = .\overline{923076})$ at five-digit precision. Firm 101 controls 92.3 percent of firm 201's assets, among them firm 201's foreign affiliates.

To calculate the FDI exposure at any hierarchy level in the corporate group, we use a single-weighting scheme with ownership shares. The economic rationale behind single-weighting is that ultimate parents are more likely to be the corporate decision units (whereas FDI conducting and reporting firms in the group may be created for tax and liability purposes). We first assign FDI exposure measures (foreign affiliate employment by world region) from domestic affiliates to their ultimate domestic parents. Suppose firm 201 in Example 2 of Figure 3 conducts FDI in the corporate group. We assign 92.3 percent of 201's FDI exposure to firm 101, the ultimate domestic parent. We then assign the same 92.3 percent of 201's FDI exposure to all affiliates of 101 (201 itself, 202, 301, 909). So, jobs throughout the group (including those at 201 itself) are only affected to the degree that the ultimate parents can control foreign-affiliate employment (or turnover). We assign only 92.3 percent of 201's FDI exposure to 201 itself because the ultimate parent only has 92.3 percent of the control over employment

Table 11: Country Group Definitions

Regions	Constituting countries
WEU	Western European countries (EU 15 plus Norway and Switzerland)
OIN	Overseas Industrialized countries including Canada, Japan, USA, Australia, New Zealand as well as Iceland and Greenland
CEE	Central and Eastern European countries including accession countries and candidates for EU membership
DEV	Asia-Pacific Developing countries incl. Hong Kong South Korea, Singapore, Taiwan, China, Mongolia and North Korea; Russia and Central Asian economies; other developing countries including South Asia (India/Pakistan), Africa, Latin America, the Middle East; including dominions of Western European countries and the United States.

at 201.[15]

For we choose single-weighting in the domestic branches of the MNE, we also single-weight foreign-affiliate employment by the ownership share of the domestic parent in its foreign affiliates. Mirroring the minimal ownership threshold of 10 percent in the MIDI data on foreign affiliates, we also discard the FDI exposure of domestic affiliates with ownership shares of less than 10 percent in our single-weighting assignment of FDI exposure to domestic jobs throughout the corporate group.

[15] An alternative assignment scheme would be double-weighting, first weighting FDI exposure by ownership and then assigning the FDI exposure to jobs throughout the corporate group using ownership weights again. We decide against double-weighting. Any weighting scheme results in exposure measures that are weakly monotonically decreasing as one moves upwards in the corporate hierarchy because ownership shares are weakly less than one. Double-weighting aggravates this property. Revisit Example 1 in Figure 3 and suppose firm 201 conducts FDI. Single-weighting assigns 50 percent of 201's exposure to affiliate 908, double-weighting only 12.5 percent. If 908 itself conducts the FDI, single-weighting assigns 25 percent of its own FDI exposure to 908, double-weighting only 6.25 percent. In economic terms, double-weighting downplays the decision power of intermediate hierarchies in the corporate group further than single-weighting so that we favor single-weighting. Recall that purely laterally related firms (sisters, aunts and nieces) are excluded from our foreign-expansion group so that firms 202 and 909 in Example 1 of Figure 3 are not relevant for the choice of weighting scheme.

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